THZ SPECTROSCOPY OF 1d-ETHANE: Assignment of ν_{18}

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We have measured[a] over 130 pure rotational transitions of the lowest torsional state, ν_{18}, of C_2H_5D using a double pass 3 meter cell held at 0.2 Torr of sample pressure in the frequency ranges of 540-600, 680-800 and 940-1080 GHz. The program ERHAM[b], Effective Rotational Hamiltonian Method, was used to construct the Hamiltonian that included ρ, ϵ_1, β, 9 rotational and centrifugal distortion constants and 8 torsional constants. Fitted values of ϵ_1 = 1127.82(35) MHz, ρ = 0.4342 MHz and β = 1.317(22) MHz enable predictions to experimental accuracy of both *a* and *b*-dipole allowed pure rotational transitions which have A - E splittings of 70 MHz and 1.3 GHz respectively. The data, combined with ground state data, will be useful to derive information regarding the potential barrier to internal rotation. This analysis supports our ongoing work to assign the infrared spectrum in the 700-900 cm^{-1} region to enable the first detection in outer planet atmospheres.

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[b]P. Groner *J. Mol. Spec.* 278 (2012) 52-67.